

Synonymy and its Discontents: Alfred Russel Wallace's Nomenclatural Proposals from the 'Species Notebook' of 1855–1859

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Abstract. Alfred Russel Wallace made fundamental contributions to biogeography and the establishment of evolutionary thinking. He was also a working collector who spent a total of twelve years traveling in Amazonia and southeast Asia, his immense collections yielding hundreds of new species. Wallace was, accordingly, intimately familiar with the diversity of species and varieties, and was attuned to fine shades of morphological difference in a geographical context. In identifying, preparing, labelling and cataloguing his myriad specimens Wallace often confronted nomenclatural issues, foremost among them keeping track of taxonomic synonyms. In the absence of internationally recognized codes of taxonomic nomenclature, synonyms proliferated in the 19th century. In Wallace's 'Species Notebook,' the most important of his field notebooks kept between 1855 and 1859 during his travels in southeast Asia, Wallace devoted several pages to addressing synonymy and related issues. I discuss Wallace's far-ranging proposals, which range from ways to stop the proliferation of synonyms to establishing central reference works to obviate the need for naturalists to redundantly review synonyms, and from cooperative natural history libraries to international committees to oversee designated publications for new descriptions. I also discuss Wallace's struggle to design an efficient catalogue layout for his collections, and how he sought to build information on geographical distribution into his cabinet and catalogue format. I consider, finally, Wallace's engagement with the principle of priority in the Species Notebook and other writings. While not all of Wallace's proposals proved practicable, several are in essence realized today; as seen through the lens of the Species Notebook, Wallace was far ahead of his time in regard to his creative solutions to the nomenclatural frustrations of his day.

1. Introduction

Alfred Russel Wallace (1823–1913) made significant contributions to a remarkable range of disciplines both scientific and social in his long and distinguished career (Berry, 2002). Wallace's scientific accomplishments, notably his foundational works in biogeography and evolutionary biology, are well known to biologists, while his social thinking is much less so. Wallace's writing on social issues typically took the form of prescriptions or solutions for real and perceived social ills. At times his scientific and social interests intersected, and there is perhaps no better example of this than Wallace's various proposals to address the highly vexing problems of synonymy and related nomenclatural issues. Here we see Wallace's characteristic creativity brought to bear on a problem of scientific practice, namely nomenclatural policy, and his schemes for making the labours of naturalists working with taxa (collectors, taxonomists, biogeographers, for example) at once easier and more efficient.

Wallace's prescriptions for remedying the synonymy problem are found in the 'Species Notebook,' the most important of the field notebooks that Wallace kept between 1855 and 1859 or 1860 (Linnean Society ms. 180), encompassing most of his eight-year expedition in Southeast Asia. The 2013 Wallace Centennial provided an opportunity to publish this notebook for the first time, with commentary (Costa, 2013). Its contents are far-ranging, from collection lists and short memoranda to lengthy discussions of an evolutionary nature. In the mix are some dozen pages with Wallace's nomenclatural proposals (Figure 1), the object of this paper. In the following exploration of Wallace's writings on nomenclatural issues I first describe Wallace as working collector and 'philosophical naturalist,' his collections and observations bearing on his quest to solve the mystery of species origins. These interests brought the problems of the proliferation of synonyms and other unsettled 19th century nomenclatural matters into sharp focus for Wallace. I then provide an overview of Wallace's prescriptions for addressing these problems; his proposals, most of which were never published, show him to be far ahead of his time in anticipating today's International Commission for Zoological Nomenclature and go-to catalogues and databases. Finally, I briefly consider some of Wallace's related nomenclatural writings, mainly his ideas on arranging collections and catalogues, and on the principle of priority in taxonomy.

2. 'A view to the theory of the origin of species'

Wallace was a self-taught naturalist, whose reading of *Vestiges of the Natural History of Creation* (Chambers 1844) at the age of 22 convinced him of the reality of transmutation (McKinney, 1972, pp. 9–12; Slotten, 2004, pp. 28–31; Fichman, 2004, pp. 66–70). Wallace and his friend Henry Walter Bates, who introduced him to entomology in 1844, were passionate beetle collectors, and their interest in beetle diversity extended to a broader philosophical interest in species and varieties: 'I begin to feel rather dissatisfied with a mere local collection; little is to be learnt by it,' Wallace wrote in 1847 to Bates, continuing that he 'should like to take some one family to study thoroughly, principally with a view to the theory of the origin of species. By that means I am strongly of opinion that some definite results might be arrived at' (Wallace Correspondence Project [WCP] letter 348). Their plan to pursue the species question by traveling to the tropics as collector-naturalists seems more than bold in view of their lack of formal scientific training, connections, or financial means, yet a year later Wallace and Bates found themselves deep in Amazonia, and their bounteous collecting commenced immediately. The two separated after their first year, for obscure reasons. Wallace spent four years in South America (1848–1852) followed by eight years in Southeast Asia (1854–1862). During that time, with the aid of able hired field assistants and an equally able agent, Samuel Stevens, in London, Wallace enthusiastically pursued what he had once referred to as 'my favourite subject—the variations, arrangements, distribution, etc., of species' (WCP348).

3. 'A blot upon our science'

As Wallace's collections both financed his travels and fuelled his pursuit of the species question, he was acutely aware of nomenclatural and taxonomic issues. Of the various unsettled matters at the time he was especially concerned with the interrelated

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Plan to stop the further increase of Synonyms.

Let 3 periodicals be appointed in each principal country of Europe & in the United States, in which ^{after a fixed date} alone ^{so as to be} new species can be described & adopted by Naturalists. For example, let the Proceedings of the Linnean Zoological & Entomological Soc^y respectively be the medium for making known new species of Plants, Animals (Insects except?) and Insects ^{described in England} & let the directors of all the public Museums & all the Chief Naturalists of Europe &c. declare their determination to recognize no names of species described in other places unless repeated here also. Let the Proceedings of all the appointed Societies be regularly published say ^{monthly} quarterly in sheets & mutually exchanged, by which means the whole body of Naturalists would become immediately aware of all descriptions of new species & all hunting through the Proceedings of ~~the~~ Scientific Societies & ~~the~~ Periodicals be unnecessary.

To make sure of not being under synonyms each Society should have certain no. of S. meeting in the year & arrange as to come a rotation. Every person called after a certain date his species had been known.

Figure 1. Sample page from Alfred Russel Wallace’s Species Notebook, Linnean Society ms. 180, p. 67 (see Costa, 2013, p. 162). Wallace’s ‘Plan to stop the further increase of Synonyms’ is the first of several proposals in the Species Notebook bearing on nomenclature and related issues concerning collections and catalogues. Image courtesy of the Linnean Society of London.

issues of priority and the proliferation of synonyms. Aside from the scientific importance of accurately identifying genera, species, and varieties, Wallace faced formidable practical and logistical concerns stemming from taxonomy: lack of clarity on identification had financial ramifications; while any beautiful or unusual species and varieties were in demand, new or rare species and varieties fetched the highest prices back in London. He also needed a concise, convenient, and clear approach to recording his innumerable specimens *and* their synonyms in his collecting notebooks and consignments to Stevens. The problem was that each synonym had its own authority and reference work giving descriptions, locality information, etc., all of which must be recorded for each specimen in order to cross-reference and compare specimens collected at different times and places.

Wallace's choice of words in the entries bearing on the synonymy problem in his Species Notebook — 'disgrace,' 'source of error & perplexity,' and 'absurdity,' for example — nicely capture his frustration. As for the concomitant problem created by proliferating synonyms, he sought to rally fellow naturalists who seemed resigned to endlessly citing ever-growing lists of authorities and synonyms for each genus and species, incredulous at their complacency — that to them it seemed 'hardly to be considered as an evil, as something to be got rid of, as a blot upon our science. . . .' (Costa, 2013, p. 122). The proliferation of synonyms in 19th century taxonomy was in fact widely acknowledged as a crisis, and naturalists lamented the endless taxonomic confusion that the lack of a uniform and stable system of taxonomic nomenclature permitted. Synonyms arose in several ways, most commonly when a given species was described or named by more than one author (for example, as a result of the same species being taken by different collectors at different times and places), and as a result of taxonomic revisions in which for various reasons previously-named species were renamed. Synonyms might, then, arise through ignorance of the published work of others, over disagreement with that work, and even deliberate efforts to undermine rival naturalists. Nationalistic prejudices sometimes played a role, when rival scientific expeditions to the same regions yielded much the same species in different collections. Melville (1995) and Ride (1999) reviewed the synonymy problem and the history of efforts to address it.

A strict (if evolving) code of nomenclature including rules on priority and synonymy was adopted by international consensus only in the 20th century. The current Code, now in the 4th edition, traces its ancestry to proposed rules and recommendations of a committee commissioned by the British Association for the Advancement of Science in the 1840s. Naturalist Hugh Strickland chaired the committee, which issued its report in 1842 (Strickland et al., 1842). This became a standing committee on rules of nomenclature, and although Wallace never served on the committee he played a role in the refinement of the rules (see e.g. his recommendations to committee member William Jardine in letters WCP4193, WCP4194, and WCP4195, from 1865). He was also concerned with the dissemination of the rules, writing to Jardine in 1863 for copies for distribution (WCP3535), and commenting in a letter to his friend Alfred Newton (WCP4004) that copies of the rules 'should be sent to all really working naturalists if any good is to be done.' This letter continues:

'At least 50 copies [should] be sent to the Secretaries of the Linnean & Zoological Societies for distribution, or no good will be done . . . Will you as a personal

Table 1. Entries in the Wallace 'Species Notebook' (Linnean Society ms. 180) bearing on nomenclature and related topics.

Topic	Notebook Page Nos. ¹
Plan to stop the further increase of synonyms	67 ²
Plan to obviate the necessity for quoting synonyms . . .	68–69 ²
Formation of a complete library of natural history	70 ²
On reference to synonyms and quotation of authorities	126–130 ³
Plan for references in synopsis	157
Form for a synonymical catalogue	158

¹Page numbers correspond to the *recto* Species Notebook; see Costa (2013)

²Three entries apparently written consecutively, in the same pen; entry on pp. 68–69 is dated February 1857.

³Constituting a single entry, dated 12 May 1858

friend of Sir W.J. & a member of the Committee write & ask to have the residue of the copies printed sent to London for distribution. I know at least a dozen working Entomologists & Conchologists who ought to have them. They should also be sent liberally abroad.' (Emphases in original, as will be true of all quoted material in this paper.)

The Strickland report of 1842 was unequivocal in its condemnation of ever-multiplying synonyms and related problems as an 'evil' (using this word five times), and lamented the 'anarchical state' of the science. Its rules and recommendations became known as the Stricklandian Code, among the very first provisions of which an assertion of the 'Law of Priority,' whereby the first name designated for a species accompanied by a complete description (and which fulfils certain basic requirements — Linnaean binominals, Latin orthography, etc.) will be the officially recognized name. This is true regardless of whether the name with priority was well known or had wide currency. The Stricklandian Code not only defined the 'Law of Priority,' but also discussed the conditions under which priority applies, when and which synonyms may be cancelled out, and exceptions to the priority rule.

4. 'An Era in Natural Science'

Wallace's remedies for the problems posed by synonymy, which, once realized, he declared would herald 'an Era in Natural Science,' are found in six entries in the Species Notebook constituting 11 pages (summarized in Table 1; see Figure 1 for example). Related entries, in particular his ideas on arranging and cataloguing his own collections and an opinion regarding the principle of priority, are found on another four pages in the Species Notebook, in one case continuing for an additional three pages in a second notebook, Wallace's 'Insect Register' for 1858 (manuscript WCP4767). In the following discussions of Wallace's proposals, space constraints preclude the complete quotation of his notebook entries, but see Costa (2013) for complete transcriptions with annotations.

The first three entries in the Species Notebook ('Plan to stop the further increase of Synonyms,' p. 67; 'Plan to obviate the necessity for quoting any Synonyms for the future,' pp. 68–69, and 'Formation of a complete library of Natural History,' p. 70), are interrelated and were likely made at the same time, judging from the appearance of the script and ink used. The second of these is dated February 1857, at which time

Wallace was collecting in the Aru Islands, where he was based from January to early July 1857. Wallace's proposals recognize the need for coordination, both among scientific societies and among countries.

A. Plan to stop the further increase of Synonyms

This plan (Figure 1) entails the designation of three journals in each country as the agreed-upon venues for the publication of new species descriptions:

'Let 3 periodicals be appointed in each principal Country of Europe & in the United States, in which alone [after a fixed date] New species can be described [so as to be] adopted by Naturalists. For example, let the Proceedings of the Linnaean Zoological & Entomological [Societies] respectively be the medium for making known New species of Plants, Animals . . . and Insects [described in England]. . .'

Wallace does not suggest what body might 'appoint' these periodicals, but implicitly this would be done by consensus among the learned societies of each nation with an active community of naturalists. Recognizing that this by itself is insufficient to ensure that descriptions are published solely in these 'go-to' journals, he then recommends that '...the directors of all the public Museums & all the chief Naturalists of Europe &c. declare their determination to recognize no names of species described in other places unless repeated here also.' The publication frequency of these journals should be increased, he next suggests, to ensure the timely communication of new descriptions:

'Let the Proceedings of all the appointed Societies be regularly published say [monthly] in sheets & mutually exchanged, by which means the whole body of Naturalists would become immediately aware of all descriptions of New species. . .'

A virtue of this scheme is that 'all hunting through the Proceedings of Scientific Societies & Periodicals become[s] unnecessary,' he declared. Wallace then had an after-thought. To ensure that the descriptions are indeed *new* species and minimize the possibility of introducing yet more synonyms, he added this suggestion written vertically in the margin: 'To make sure of not having more synonyms each Society should have certain N. S. [New Species] meeting in the year so arranged as to come in rotation. Every person could then be certain whether his species had been previously published.' Although Wallace's plan would make it easier for naturalists to find or keep up with new species descriptions (thereby remedying ignorance of existing descriptions, one of the main factors contributing to synonymy), he had not thought through how the appointed journals of different countries might coordinate; the door to synonymy by redundant species descriptions by naturalists of *different* countries was still open.

B. Plan to obviate the necessity for quoting any synonyms for the future

This next entry takes a step in the direction of international coordination. Here Wallace suggests a complete authorized catalogue, a central repository of synonyms for each branch of natural history 'prepared and corrected by Committees of

Naturalists in every country of Europe...’ (and presumably other countries). Wallace envisioned that this catalogue would give ‘all the synonyms under which each species has ever been described or figured since the establishment of the binomial nomenclature, with full references; at the same time determining, by authority, the true & standard specific name to be henceforward used by all naturalists without quotation of Synonyms.’ The international committees would be charged with determining ‘true Synonyms’ by ‘comparisons of the original specimens in all doubtful cases.’ The prospect of a central authoritative repository of all synonymical information for each species, such that naturalists need only cite this source and not be compelled to recount lengthy lists of synonyms and authorities repeatedly in each taxonomic paper and monograph, must have delighted Wallace. He rather idealistically enthused over the benefits he envisaged from this scheme:

‘This Catalogue being published, uniformity & simplicity of nomenclature will reign among Naturalists. In all Catalogues Lists, Synopses &c. & in all exchanges of specimens & communications among naturalists one specific name only need be used — every one being supposed to have a copy of the Catalogue in the department he studies [& all collections to be named by it]. The expense of all future Catalogues & systematic works will thus be much diminished a great portion of their space being now occupied by references to the synonyms. Uniformity in the naming of collections will be introduced & thus a fertile source of error & perplexity removed, & all those numerous ‘aliases’ which are a disgrace to Nat[ural] History will be kept out of sight, & only referred to for purposes of study.’

C. Formation of a complete library of natural history

The previous plan may have inspired this one — that is, the idea of a central authoritative catalogue may have suggested to Wallace going one step further, and having a centralized natural history library system where catalogues and other works could be more easily consulted by naturalists. ‘That such does not exist is discreditable to Naturalists,’ Wallace wrote at the opening of this proposal. His idea is essentially one of resource-sharing:

‘It is proposed that the chief [Natural History] Societies (Linnaean, Zoological & Entomological) should, while keeping their Libraries distinct, have them under one roof in adjoining rooms & under the care of one Librarian. Members of all the Societies to have free use of all in the Library, duplicates only to be taken out, except . . . for short periods & on leaving a deposit of the value of each work.’

The suggestion of the scientific societies housing their libraries in adjoining rooms, under one roof, for easy access by their collective membership is reminiscent of the cooperative libraries that Wallace frequented back in England. Forerunners of modern public libraries, the working-men’s libraries and mechanic’s institutes of Wallace’s formative years in London, Neath, and Leicester were accessible free or charge or for a very modest fee, and the self-taught Wallace often availed himself of their books, periodicals, and lectures (Slotten, 2004, pp. 10–21). Such libraries were not the pooled resources of cooperating institutions, but nonetheless evoke the spirit of cooperative sharing and accessibility seen in this proposal, connected to and

reflecting Wallace's Owenite ideals of social justice (Claeys, 2008). This could be why Wallace changed his mind about his initial suggestion that original works (as opposed to duplicates) in the shared library could only be taken out 'by members of the Society to which the work belongs.' He thought better of this and struck the sentence — not suggesting that everyone regardless of membership should have this privilege instead, but that no one should have it — on the grounds, presumably, that it is better to require in-house use of works for which there are no duplicates. Wallace closed his proposal by pointing out its practical financial benefits: 'Saving of Expense in rooms & Librarian to be spent on Books, each adding works in its own department. To such a joint library many expensive works would be given by foreign governments which could not be afforded to each of the three.'

D. On the reference to Synonyms & the quotation of Authorities by Naturalists

Jumping ahead just over 50 pages in the Species Notebook we come to this five-page entry dated 12 May 1858. At that time Wallace was collecting in Dorey (now Manokwari), western New Guinea, where he had landed after departing the Moluccas in March of that year (not before, incidentally, posting to Darwin his famous 'Ternate essay' announcing his discovery of the natural selection mechanism). On the very day that Wallace dated this entry he was laid up; he had been confined indoors for weeks with a fever and sore foot, and one of his Malay assistants, Jumaat, was gravely ill (and tragically died the following month).

Synonymy was again on Wallace's mind, and this entry is both lengthier than his previous ones and is written in a didactic style suggesting he intended to publish it (but apparently did not). It is worth noting, too, that it is preceded by two pages in which Wallace sketches candidate plans for arranging his beetle collection once he returned to England, struggling with how best to arrange his specimens taking into account their taxonomic placement *and* geographical distribution. There is much struck text and marginal notation on these pages, ending with a scrawled note in pencil at the bottom of the second page: 'NB. for improved plan see p. 24 of 'Register 1858.' I will discuss this in the next section of the paper, but first I consider Wallace on the issue of referring to synonyms and quoting Authorities.

Wallace opened the discussion with a statement of the problem: 'This practice is so universal that most naturalists look upon it as an inevitable necessity. . . It seems hardly to be considered as an evil, as something to be got rid of, as a blot upon our science, & as one of the causes which decrease its popularity & deter enquiries at the outset.' What's more, he says, the practice is a waste of space and effort:

'If we take up any natural history catalogue, or work describing species, we find a considerable portion of it occupied by names only & references to volume & page of every work in which the species have been mentioned described or figured. A third, a half or even three fourths of a work is often so occupied, & the task of compiling these references is one of the greatest & most tedious labours of the monographer.'

There is no need to repeat this information 'over & over again' in treatments of local fauna and species descriptions, Wallace says. After all, 'We do not give the etymology & derivation of foreign or local terms every time we have occasion to use them — the vulgar can call a 'lion' by its name without requiring to know when it first became an

English word, by whom & whence it was introduced. . . Such information must be sought in Etymological dictionaries if any where[,] not in [works] which describe Lions & their habits.’ His solution is, again, to establish central, agreed-upon reference works: a reference for references.

‘What we want is a series of general synonymical catalogues which should give all the references, & determine authoritatively & finally the specific name to be used & it would then be only necessary in any work describing species, to state that the names used in such a family or group were those of the catalogue, & use them as names only without reference or authority . . . Now it is this absurdity that the naturalist daily practices — he cannot use a name without stopping to give its origin & all the various errors that have been made respecting it, & quoting every work in which the object it distinguishes has been mentioned or described.’

Realizing that ‘some reference is necessary to enable persons to recognize the species who may only know it under one of its synonyms,’ Wallace proposed a streamlined citation format, settling finally on a format summarized in a marginal note:

‘N.B. Give at most references to 3 works.

1st. Authority for species name . . .

2nd. where best figured . . .

3rd. To some cheap & well known list where synonyms are given . . .

This will give all the information necessary in a very small space.’

In other words, Wallace suggested that three references be given for each species: the authority and publication of the first description; where the best figure of the species can be found, and a go-to source for synonyms for the species (like that described above, given on pp. 68–69 of the Species Notebook). He was emphatic about the benefits of such a scheme:

‘The beauty & advantage of the binomial nomenclature is in fact completely neutralised if we are obliged to quote a host of synonyms in addition. The old specific phrase would be better than this; — it would occupy less room & would in the majority of cases ensure the determination of the species. In the meantime Naturalists should combine to check the further increase of synonyms by adopting the plan proposed at p. 67.’

In this entry Wallace declares that the adoption of such synonymical catalogues by united naturalists would usher in ‘an Era in Natural Science,’ it only being ‘necessary to form the catalogues . . . complete up to that date & Naturalists might boast of a universal language — brief definite & unchangeable — which they cannot do with justice at the present time.’ Although various forms of synonymical catalogues did become subsequently available, these tended (and in large part still tend) to be taxon-specific. Electronic resources hold new promise for scope and accessibility, such as the registry of new taxonomic names launched in 2003 by the *Zoological Record* in partnership with BIOSIS (Thorne, 2003), and more recently *ZooBank* (zoobank.org), an on-line registry of available zoological names developed by the ICZN, launched in January 2008 (Polaszek et al., 2005; Pyle & Michel, 2008; Krell, 2009).

E. Plan for references in Synopsis

Here Wallace offers a format for taxonomic overviews or synopses whereby cited authors are alphabetically listed, with the key references for each given in a lettered list (reference a, b, c, etc.). Following this prefatory section, in the taxonomic monograph itself the author and letter of the relevant references would need only be cited, rather than repeatedly writing out the references in full under each species. He follows his earlier idea of citing three references for each species: original author, best figure, and synonymical catalogue. Among several examples is the bee beetle *Trichius abdominalis* (SCARABAEIDAE, TRICHIINAE), for which Wallace lists ‘Schmidt’ reference (a) as authority, ‘Olivier’ reference (a) for a good figure, and ‘Blanchard’ reference (d) for synonyms. Another is the hawk *Accipiter ruficeps* (Accipitridae), under which Wallace listed Gray reference (c) for author, Gray (a) for figure, and Strickland (b) for synonyms.

F. Form for a synonymical catalogue

In this last entry on synonymy Wallace gave an outline of a comprehensive catalogue of synonyms for each species, of the kind proposed on pp. 68–69 of the Species Notebook. One of his examples uses *Cetonia aruginosa* (now *aeruginosa*), a scarabaeid beetle. The following entries Wallace gave for this species are selected from a larger list to give a sense of the format he had in mind. They take form of author, synonym, reference, and year of publication, in orderly columns:

Drury	<i>Cetonia aruginosa</i>	<i>Illustrations of Natural History</i>	1770
Scopoli	<i>Scarabaeus speciosissimus</i>	<i>Del. Flora et Fauna Insubr. Ticini</i>	1776
Olivier	<i>Cetonia aurata</i> var.	<i>Entomologie</i>	1789
Fabricius	<i>Cetonia fastuosa</i>	<i>Systema eleuthatorum</i>	1801
Gory et Perch.	<i>Cetonia aruginosa</i>	<i>Monographie des cétoines. . .</i>	1833
Burmeister	<i>Cetonia aruginosa</i>	<i>Handbuch der Entomologie</i>	1842

Wallace decided, however, that such a comprehensive synonymical catalogue would end up being too much work: ‘The above would be an immense labour & of no necessity.’ Returning to the format he explored previously, he concluded that ‘A catalogue determining authoritatively the name to be used & giving references to the 2 or 3 best figures & original descriptions would be ample. This would be possible, the other impossible!’ He must have been dismayed at the prospect of a comprehensive catalogue in view of the ever-growing roster of known species plus the sheer number of synonyms associated with these.

5. ‘Valuable & instructive for reference & comparison’

Wallace’s ideas for synonymical catalogues were likely related to his concern with how best to arrange and catalogue his personal collections. There are two important entries in the Species Notebook bearing on this: the first, alluded to already, is titled ‘Plan for the arrangement of my Collection of Coleoptera – on return to England’ (pp. 124–125). The other is a ‘Note for descriptions in ‘Coleoptera Malayana’’ (p. 133). Although collection arrangement may seem tangential to nomenclatural matters, in this case the entries give insight into Wallace’s global perspective and how he envisioned that the arrangement of collections could both inform and reflect taxonomy and cataloguing. For example, in his plan for the arrangement of his

Coleoptera collection, he suggests that he should arrange the species for each family in order of locality from west to east. The localities as well as the specimens were to be numbered consecutively; this would then yield a catalogue with distribution data for each family: ‘Under each locality therefore would be found only those species first found there,’ he wrote, and so-arranging specimens in cabinets ‘will be also generally natural’ — language reflecting his grasp of the essential correspondence between species relationships and their geography.

After further consideration Wallace returned to these entries and made additional marginal notes in pencil. At the bottom of p. 125 he wrote ‘N.B. for improved plan see p. 24 of – ‘Register 1858.’ This is a reference to his ‘Insect Register’ notebook (WCP4767, pp. 24–26) where he summarized the ‘improved plan’:

‘The best plan therefore seems to be to take one family first, say Longicorns, & beginning with one locality, say Sarawak, relax and reset the specimens and attach new locality tickets with a consecutive series of numbers, in approximate systematic order so as to keep the species of the well-marked genera together (though this is of little or no importance) . . . A second locality (say Singapore) is then taken & a fresh series of numbers begun & so on through all the localities. Space may be left for addition to each locality & also at the end for any fresh localities of importance in the Archipelago (as Java Sumatra).

Another family, say Cicindelidae, being then taken, the numbers attached to the species are to be in continuation of those of the same locality in the former family, so that when the catalogues are completed there will be a consecutive series of numbers for each locality shewing the total number of species found there. Additions to any family from the same locality may have a fresh series of numbers. . .’

In this way Wallace saw the integration of collections and catalogues: The catalogue generated by this method of arrangement ‘would thus be a most useful preliminary to a synopsis & would also furnish at once with scarcely any alterations complete locality lists. . .Catalogues of two or more families would be contained in a light pocket volume convenient for carrying to museums &c. when determining species by comparison. . .’ Wallace concluded that this approach would be ‘valuable & instructive for reference & comparison.’

Wallace’s ‘Note for descriptions in ‘Coleoptera Malayana’” refers to the comprehensive treatment of his southeast Asian beetle collections that he planned to undertake once he returned home. He described the plan in a letter dated 2 March 1858: ‘. . . I look forward to undertaking on my return to England a ‘Coleoptera Malayana’ to contain descriptions of the known species of the whole archipelago, with an essay on their geog. distribution, and an account of the habits of the genera & species from my own observations’ (WCP367). This plan was never realized, the closest being the ‘*Longicornia Malayana*’ treating Wallace’s long-horned beetles, published by Francis Pascoe between 1864 and 1869. Pascoe’s approach differed from Wallace’s, however, with a format more typical of the time. In any case, Wallace’s plan as given in the Species Notebook takes the approach of giving the key characters for each species in bold or larger type followed by the remainder of the description, then habitat and references for authority and best figure. Synonyms are not mentioned, however.

6. 'This should not be allowed'

The final nomenclatural matter arising in the Species Notebook regards the principle of priority in recognizing species names. There is but one entry on this subject (p. 130), involving what Wallace took to be a case of changing a taxonomic name for unacceptable reasons: 'Thompson changes *Aphies* Dej. (a coleopteron) into *Amillarus* Thomp. on account of *Aphis* a genus of Hemiptera.' Evidently coleopterist James Thomson (not Thompson) felt that the beetle genus name *Aphies*, given by French entomologist Auguste Dejean in 1837, was too similar to the aphid genus *Aphis* and he took it upon himself to change it to a name of his own. In his revision (Thomson 1857, p. 312), Dejean's *Aphies* was given as 'nom déjà employé, or 'name already employed.' 'This should not be allowed,' Wallace wrote disapprovingly in the Species Notebook; he did not elaborate, but likely felt that making nomenclatural changes on the arbitrary basis of similar-sounding names was unfair, and would introduce yet more confusion to an already chaotic taxonomic system.

This may be the only example where priority is mentioned in the Species Notebook, but Wallace weighed in several times on questions of priority in letters, addresses, and papers. In most cases Wallace argued *against* a name change that had been proposed or effected; his positions were not always based on strict priority, and underscore the complexities of applying the priority rule. For example, in Wallace (1858) he argued against Edward Doubleday's name-change for a species of *Ornithoptera* butterfly, pointing out that the new name, although used earlier by Linnaeus and so seemingly having priority, was in fact based on an error of identification by Linnaeus (who mistakenly named males and females of these sexually dimorphic butterflies as different species, confusing matters). Wallace felt that the misapplied though earlier name should not displace the name in use, given by a later lepidopterist who correctly identified the males and females of the species in question for the first time. Similarly, in a published letter (Wallace 1861) he lambasted zoologists P.L. Slater and G.R. Gray for changing the names of certain birds: 'It strikes me that, by forcing the law of priority to its extreme limits, you create a complicated synonymy, instead of settling it. Was not that law made to decide among several names already in use—not to introduce diversity where uniformity of nomenclature has hitherto existed?' In this letter, too, are echoes of some of Wallace's proposals to remedy the synonymy problem:

'I believe the synonymy of Natural History will never be settled till a tribunal shall be appointed by general assent, from whose decrees there shall be no appeal. It matters absolutely nothing whether a bird has one name or another; but it is of the utmost importance that it should not have two or three at once. A synonymical catalogue, which should be authoritative and final by the general consent of naturalists in congress assembled, would be a work worthy of the century. Let ornithologists be the first in the field, and the other -ologists will soon follow.' (Wallace, 1861)

A decade later little had changed; in his Presidential Address to the Entomological Society of London for 1872 he lamented that 'we shall never obtain complete uniformity and permanence of nomenclature, as long as each writer of a monograph or compiler of a catalogue thinks himself at liberty to use it as a medium for

expressing his own views on the subject.’ He went on to reiterate his ‘tribunal’ proposal:

‘To enact laws is of little use if we have no judges to interpret them. I have long been of opinion that we require a tribunal to decide authoritatively what changes of nomenclature shall be allowed; and though I have often been told this is impracticable, I cannot yet see the impracticability. As an example of what I mean, I would propose that the Natural-History Societies of each of the great nations of Europe and America should appoint one or more well-qualified naturalists to form a Judicial Committee of Nomenclature, all these societies, of course, agreeing to abide by the decisions of such committee. It might meet once a year, or even less frequently (as much business might be done by means of a Secretary), when any one could lay before it cases of non-accordant or erroneous nomenclature, with reasons and authorities for proposed changes. Its decisions, once given, would be adopted in the publications of all the societies, and this would soon lead to their universal adoption.’ (Wallace, 1872, p. lxviii).

Wallace felt that this idea was as worthy as it was attainable: ‘I cannot believe that there would be any great difficulty in its practical working; still less can I believe that its decisions would not be respected, and that it would not help us to obtain, much earlier than we otherwise should do, a uniform and permanent nomenclature’ (Wallace, 1872, p. lxviii). Yet, more than twenty more years would pass before the International Commission on Zoological Nomenclature would be founded, in 1896.

In 1863 Wallace’s ire was raised again over the priority issue — and once again by Doubleday and Gray. The case involving Doubleday pertained to the butterfly genus *Iphias*, which Doubleday had sought to synonymize with an earlier-named genus given by Pierre Hübner. Wallace (1863a) rejected the change on the questionable grounds of what might be called ‘settled taxonomy’ — sticking with a name that had been in wide use despite evidence that it did not have priority (though he apparently did take proper description into account.) He wrote, rather scathingly:

‘I have retained Boisduval’s name *Iphias* for this genus, because he first properly characterised it; and his name was, I believe, in universal use among entomologists till Mr. Doubleday, in his ‘Genera,’ revived Hübner’s forgotten name *Hebomoia*, thereby doing his best to introduce confusion and misunderstanding into a perfectly satisfactory and uniform nomenclature . . . I presume that the proper application of the law of priority is to determine among conflicting names still in use, and thus establish a uniform nomenclature. To apply it to rake up obsolete names, and thus create synonyms and produce the confused nomenclature it was intended to abolish, is an abuse which ought not to be tolerated.’ (p. 2)

The issue at stake in Wallace’s paper ‘On the proposed change in name of *Gracula pectoralis*’ (1863b) was closer to home, as it pertained to a name he had coined. In an open letter to the editors of the *Annals and Magazine of Natural History* Wallace objected to Gray (1862) synonymizing his myna bird species *Gracula pectoralis* with a name given earlier by the French naturalist René Lesson. Wallace argued that the specimen used by Lesson actually consisted of the parts of two or more species: ‘It seems probable, therefore, that Lesson’s specimen was made up of the *trunk* of my bird, with the *head, wings, tail, and legs* of one or more other birds,’ calling it an ‘ingenious

work of art. . . .’ Yet another name was bestowed independently by an American ornithologist, but based on a mutilated specimen, prompting Wallace to ask ‘Shall a name, given to a mutilated skin, and which is erroneous and inapplicable as regards the perfect bird, be perpetuated by the law of priority?’ He summarized his case thus:

‘In this case we have, first, a name and description of a made-up specimen, of which probably one-fifth part only is genuine, and, secondly, a specimen confessedly mutilated in its most important parts, and the name given to which is inapplicable to the entire bird; and in both cases the absence of the legs and wings has led to the species being placed in a wrong genus. I now leave ornithologists to decide, in the interest of science, by what name this bird shall be called; and I would further beg to suggest, as a useful and necessary supplement to the law of priority, that it be decreed *that where the first description of a species is absolutely insufficient to determine the same, and a new name has, owing to such insufficiency, been given to the species, with a good and sufficient description attached, such new name shall be for ever retained, notwithstanding at any future time the former name may be proved to have been applied to the same species.*’ (Wallace, 1863b, p. 17)

During Wallace’s tenure as president of the Entomological Society (1870 to early 1872) issues of classification and nomenclature were constantly discussed — in particular nomenclatural issues pertaining to genera. In his Presidential Address for 1870 Wallace commented that ‘five very valuable papers are on subjects connected with classification and nomenclature.’ These included two papers on beetles that ‘[brought] to light an amount of confusion and error in generic nomenclature,’ and an essay on generic nomenclature in butterflies that revealed ‘a state of confusion in that group’ similar to that shown for the beetles (Wallace, 1870). The priority rule often came up in his letters. ‘I hold that a generic name cannot claim priority, which itself breaks the law of priority in changing an old generic name,’ he wrote to Alfred Newton in 1875 (WCP4051). He continued: ‘Have you read Lewis’ paper on ‘Entomological Nomenclature & Law of Priority’? It applies to zoology generally, & I believe his proposals are sound & will sooner or later be adopted.’ His reference is to a paper on priority by entomologist William Arnold Lewis (1875), extracted from Lewis’s earlier treatise on the subject (1872).

If Wallace was not always consistent in his view of how and when the principle of priority should be applied, whether to genera or species, he did think broadly and was open to novel and unorthodox solutions. We have seen that he at times advocated for exceptions to the priority rule, yet he also wrote approvingly to Alfred Newton in 1863 about Arthur Adams who ‘sticks up for the law of priority, without exceptions absolutely, & has almost converted me to the adoption of the Boddaertian names as a matter of principle’ (WCP4004). Adams and Adams (1858) championed the recognition of bird names bestowed in 1783 by the Dutch naturalist Pieter Boddaert in a treatment of birds using the color plates executed by E.-L. Daubenton for Buffon’s *Histoire naturelle* of 1749–1789. Accompanying the plates Boddaert (1783) gave accounts of the birds from Buffon, Linnaeus, and others, devising Latin names for those birds that lacked one. Wallace was perhaps ‘almost converted’ — but not fully — by the fact that Boddaert’s treatments were neither his own, nor in many cases proper descriptions. (Nonetheless, today many of Boddaert’s names are recognized.)

Another example of Wallace's openness to creative, if unworkable, proposals is his endorsement in 1874 of an idea to extend the priority principle to the entire Linnaean binominal, not merely the specific epithet. 'Mr. David Sharp, a well-known entomologist, advocates a mode of attaining the great desideratum of naturalists—a fixed and uniform nomenclature of species — which has not, so far as we are aware, been suggested before, although it is at once simple and logical. He proposes that, not merely one-half, but the entire name of every species once given, should be inviolable. . .' (Wallace, 1874, p. 259). This proposal did not go anywhere, however, which Wallace predicted (and with good reason). Wallace was aware and indeed commented that under this proposal a full binominal species like *Papilio dido* would remain a unit with priority even if its very family should change, and even should new methods of classification find that it belonged in another genus altogether! He was perhaps being provocative, underscoring the need for rules pertaining to generic as well as specific names, and ever the optimist he closed his review with a plan 'best adapted to lead speedily to a fixed nomenclature, and at the same time one that will least offend the prejudices of zoologists. . .' (Wallace, 1874, p. 260).

7. Conclusion

A fixed nomenclature is an unknown ideal and even, perhaps, an impossibility given centuries of free-wheeling naming and revising of taxa, as well as new methods and types of characters used by naturalists for diagnosis, from morphological to chemical to various classes of molecular-genetic data. Wallace may have been inconsistent at times in his view of issues like priority, but this only reflects the difficulties inherent in delimiting and applying the principle at a time when nomenclatural rules themselves were being hotly debated. Yet Wallace was ahead of his time with several of his proposals, perhaps foremost among them recognizing the need for coordination and cooperation among the scientific communities of different nations to both combat synonymy and arbitrate nomenclatural disputes. The International Commission on Zoological Nomenclature, founded in 1896 as noted previously, is just such a body, charged with developing, refining, and applying the International Code of Zoological Nomenclature (ICZN) for the zoological community. As interpreter and arbiter of the Code, communicated since 1943 through its key publication *The Bulletin of Zoological Nomenclature*, the ICZN represents the realization of the kind of 'tribunal. . .appointed by general assent' that Wallace advocated (Wallace, 1861; 1872).

Wallace's prescience is also seen in his recognition of the importance of standard and readily available synonymical catalogues as essential sources for nomenclatural information, and in his rather democratic vision of pooling or sharing bibliographic resources among organizations to facilitate the work of naturalists. Both have been realized in ways that would have delighted him: the 'virtual commons' made possible by information technology and the internet has revolutionized the communication of taxonomic information and literature. On-line references and repositories like *ZooBank*, *Zoological Record*, *Index Animalium* and *Nomenclator Zoologicus* represent the ultimate in universally available (in principle) catalogues of taxonomic information in zoology, while the *International Plant Name Index*, *Tropicos*, and *Index Nominum Supragenericorum Plantarum Vascularium* (among others) achieve this for the botanical realm.

The recent amendment to accept e-publication of works in zoological nomenclature and taxonomy by the ICZN (BZN 69(3): 161–169; <http://iczn.org/content/electronic-publication-made-available-amendment-code>) will facilitate the linkage between taxonomic databases (as modern versions of catalogues) and taxonomic publications, increasing visibility, access, and precision as advocated by Wheeler & Krell (2007). Moreover, libraries and scholarly organisations can now share their books and periodicals as never before; where Wallace suggested library resources of a few learned societies pooled under one roof, we now have a multitude of libraries sharing resources beneath one virtual roof, thanks to such invaluable organizations as the Biodiversity Heritage Library (biodiversitylibrary.org), Botanicus (www.botanicus.org), and the HathiTrust Digital Library (hathitrust.org). In the future additional proposals found in Wallace's Species Notebook may come to fruition as well. There is at present no single central site or source required for registering zoological nomenclatural acts, for example, but if *ZooBank* registration becomes obligatory, as the ICZN envisions, this may eventually serve as the central clearing-house for zoological names and their bibliographic references.

Non-uniformity in taxonomy — that 'fertile source of error & perplexity' that Wallace lamented — may persist indefinitely owing to the vagaries of the historical record and philosophical differences, and a single synonymical catalogue or universal taxonomic database for the tree of life may prove quixotic, but Wallace's far-ranging proposals in the Species Notebook hold lessons for the pursuit of such ideals. With regard to the quagmire of synonymy and cataloguing Wallace may have got more than he bargained for back in 1847 when he declared his intent to pursue his 'favourite subject—the variations, arrangements, distribution, etc., of species.' But then, he was not one to let such concerns slow him down. Therein may lie the most important insight we may glean from Wallace's proposals for addressing the nomenclatural issues of his day. His ideas are worthy of our notice not so much, perhaps, as overlooked solutions, or examples of a man ahead of his time, as for how they underscore the value of persistently and creatively thinking about solutions to our nomenclatural conundrums.

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